

IN THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the Application:

LISTING OF CLAIMS:

1. (Currently amended) A network adapter that may be used in a network data storage system to permit data communication among data exchanging devices and a data storage system input/output (I/O) controller, the controller residing in the data storage system, the data exchanging devices being external to the adapter, the adapter comprising:

one or more interfaces that may be coupled to an electrical backplane of the system, the backplane being coupled to the controller and being configured to permit communication between the controller and the adapter when the one or more interfaces are coupled to the backplane; and

a switching system integrated into the adapter, the switching system having a first set of ports that may be coupled to the data exchanging devices and a second set of ports that may couple the switching system to the controller when the one or more interfaces are coupled to the backplane,

wherein the switching system is configured to selectively provide one of (i) communications between the controller and the data exchanging devices through the first and second sets of ports, and (ii) a test loop which loops the second set of ports back to the controller to enable the controller to diagnostically test

controller operation and connectivity between the controller and the adapter through the backplane using a set of test vectors through the second set of ports;

wherein the switching system is further configured to isolate the controller from the data exchanging devices to avoid escape of signals from the controller to the data exchanging devices when the switching system selectively provides the test loop; and

wherein the controller is a single circuit board having multiple Fibre Channel interfaces, and wherein the switching system is configured to daisy chain the multiple Fibre Channel interfaces of the single circuit board together exclusive of the data exchanging devices when the switching system selectively provides the test loop;

wherein the adapter is a host bus adapter device which interconnects between a host node and the controller, the controller being configured to operate as a front-end interface between the host node and a cache of the data storage system; and

wherein the adapter further comprises:

control circuitry coupled to the one or more interfaces and further coupled to the switching system, the control circuitry being configured to perform host bus adapter operations to move data between the host node and the cache when the switching system is not selectively providing the test loop, the host bus adapter

operations being different than disk adapter operations for moving data between the cache and the data exchanging devices.

2. (Original) The adapter of claim 1, wherein the one or more interfaces comprise at least one interface through which a command may be issued to the adapter to cause the adapter to change from an operational mode to a diagnostic mode.
3. (Original) The adapter of claim 1, wherein the data storage system comprises a set of mass storage devices that may exchange data with the data exchanging devices via the adapter.
4. (Original) The adapter of claim 1, wherein the adapter is assigned a network layer address based at least partially upon a slot identification number that identifies a location in the data storage system in which the adapter resides.
5. (Original) The adapter of claim 1, wherein the switching system comprises a fibre channel switching fabric.
6. (Original) The adapter of claim 1, wherein the one or more interfaces comprise a management interface through which the controller may issue via the backplane a command to the adapter.

7. (Original) The adapter of claim 1, wherein the one or more interfaces permit a processor to issue a command to the adapter via the backplane, the processor being external to the data exchanging devices, the adapter, and the controller.

8. (Original) The adapter of claim 7, wherein the processor is external to the data storage system.

9. (Original) The adapter of claim 7, wherein a first network address of the adapter may be changed during a configuration of the data storage system to a second network address, the processor being coupled to the adapter via a network, the adapter being accessible via the network using the second network address.

10. (Original) The adapter of claim 1, wherein the one or more interfaces include a first interface and a second interface, the first interface permitting the controller to issue a first command to the adapter for causing the adapter to change from a first mode of operation to a second mode of operation, the second interface permitting configuration-related information to be retrieved from a non-volatile memory comprised in the adapter.

11. (Original) The adapter of claim 10, wherein in the second mode of operation, a diagnostic test of the adapter is performed.

12. (Original) The adapter of claim 11, wherein the diagnostic test comprises one of a built-in self-test (BIST) of the adapter and a different test of the adapter, the different test including transmission of a test vector along a first test path in the adapter, the test path beginning and ending at a first I/O port that couples the adapter to the controller when the one or more interfaces are coupled to the backplane, the test path including a subset of the first set of ports of the switching system.

13. (Original) The adapter of claim 12, wherein the different test also includes the transmission of a test vector along a second test path in the adapter, the second test path beginning and ending at a different I/O port that couples the adapter to the controller when the one or more interfaces are coupled to the backplane, the second test path including a different subset of the first set of ports of the switching system.

14. (Original) The adapter of claim 1, wherein the adapter is an electrical circuit card that is configured to be electrically and mechanically coupled to the backplane.

Claims 15-17 (Canceled).

18. (Currently amended) A method of using a network adapter in a network data storage system to permit data communication among data exchanging devices and a data storage system input/output (I/O) controller, the controller residing in the data storage system, the data exchanging devices being external to the adapter, the adapter including one or more interfaces and a switching system, the method comprising:

coupling the one or more interfaces to an electrical backplane of the system, the backplane being coupled to the controller and being configured to permit communication between the controller and the adapter when the one or more interfaces are coupled to the backplane;

coupling a first set of ports of the switching system to the data exchanging devices; and

coupling a second set of ports of the switching system to the controller; and

selectively providing one of (i) communications between the controller and the data exchanging devices through the first and second sets of ports, and (ii) a test loop which loops the second set of ports back to the controller to enable the controller to diagnostically test controller operation and connectivity between the controller and the adapter through the backplane using a set of test vectors through the second set of ports;

wherein selectively providing the test loop includes isolating the controller from the data exchanging devices to avoid escape of signals from the controller to the data exchanging devices; and

wherein the controller is a single circuit board having multiple Fibre Channel interfaces, and wherein isolating includes daisy chaining the multiple Fibre Channel interfaces of the single circuit board together exclusive of the data exchanging devices;

wherein the adapter is a host bus adapter device which interconnects between a host node and the controller, the controller being configured to operate as a front-end interface between the host node and a cache of the data storage system; and

wherein selectively providing includes:

performing host bus adapter operations to move data between the host node and the cache when the switching system is not selectively providing the test loop, the host bus adapter operations being different than disk adapter operations for moving data between the cache and the data exchanging devices.

19. (Original) The method of claim 18, further comprising issuing a command through at least one interface of the one or more interfaces, the command being for causing the adapter to change from an operational mode to a diagnostic mode.

20. (Original) The method of claim 18, wherein the data storage system comprises a set of mass storage devices that may exchange data with the data exchanging devices via the adapter.

21. (Original) The method of claim 18, further comprising assigning a network layer address to the adapter based at least partially upon a slot identification number that identifies a location in the data storage system in which the adapter resides.

22. (Original) The method of claim 18, wherein the switching system comprises a fibre channel switching fabric.

23. (Original) The method of claim 18, wherein the one or more interfaces comprise a management interface, and the method also comprises issuing from the controller a command to the adapter via the backplane.

24. (Original) The method of claim 18, wherein the one or more interfaces permit a processor to issue a command to the adapter via the backplane, the processor being external to the data exchanging devices, the adapter, and the controller.



25. (Original) The method of claim 24, wherein the processor is external to the data storage system.

26. (Original) The method of claim 24, wherein a first network address of the adapter may be changed during a configuration of the data storage system to a second network address, the processor being coupled to the adapter via a network, the adapter being accessible via the network using the second network address.

27. (Original) The method of claim 18, wherein the one or more interfaces include a first interface and a second interface, the first interface permitting the controller to issue a first command to the adapter for causing the adapter to change from a first mode of operation to a second mode of operation, the second interface permitting configuration-related information to be retrieved from a non-volatile memory comprised in the adapter.

28. (Original) The method of claim 27, further comprising, causing the adapter to change from the first mode of operation to the second mode of operation, and when the adapter is in the second mode of operation, performing a diagnostic test of the adapter.

29. (Original) The method of claim 28, wherein the diagnostic test comprises one of a built-in-self-test (BIST) of the adapter and a different test of the adapter, the different test including transmission of a test vector along a first test path in the adapter, the test path beginning and ending at a first I/O port that couples the adapter to the controller when the one or more interfaces are coupled to the backplane, the test path including a subset of the first set of ports of the switching system.

30. (Original) The method of claim 29, wherein the different test also includes the transmission of a test vector along a second test path in the adapter, the second test path beginning and ending at a different I/O port that couples the adapter to the controller when the one or more interfaces are coupled to the backplane, the second test path including a different subset of the first set of ports of the switching system.

31. (Original) The method of claim 18, wherein the adapter is an electrical circuit card that is configured to be electrically and mechanically coupled to the backplane.

Claims 32-40 (Canceled).

41. (Currently amended) A network adapter configured to permit data communication among data exchanging devices and a data storage system input/output (I/O) controller of a network data storage system, the controller residing in the data storage system, the data exchanging devices being external to the data storage system, the network adapter comprising:

adapter interfaces configured to couple to an electrical backplane of the network data storage system, the electrical backplane being coupled to the controller and being configured to permit communication between the controller and the adapter when the adapter interfaces couple to the electrical backplane; and

a switching subsystem coupled to the adapter interfaces, the switching subsystem having a first set of ports configured to couple to the data exchanging devices and a second set of ports configured to couple to the controller when the adapter interfaces couple to the electrical backplane;

the switching subsystem being configured to selectively provide one of (i) communications between the controller and the data exchanging devices through the first and second sets of ports, and (ii) a test loop which loops the second set of ports back to the controller to enable the controller to diagnostically test controller operation and connectivity between the controller and the adapter through the backplane using a set of test vectors through the second set of ports;

the switching subsystem being further configured to isolate the controller from the data exchanging devices to avoid escape of signals from the controller

to the data exchanging devices when the switching subsystem selectively provides the test loop;

the controller being a single circuit board having multiple Fibre Channel interfaces; and

the switching subsystem being further configured to daisy chain the multiple Fibre Channel interfaces of the single circuit board together exclusive of the data exchanging devices when the switching subsystem selectively provides the test loop;

wherein the adapter is a host bus adapter device which interconnects between a host node and the controller, the controller being configured to operate as a front-end interface between the host node and a cache of the data storage system; and

wherein the network adapter further comprises:

control circuitry coupled to the one or more interfaces and further coupled to the switching system, the control circuitry being configured to perform host bus adapter operations to move data between the host node and the cache when the switching system is not selectively providing the test loop, the host bus adapter operations being different than disk adapter operations for moving data between the cache and the data exchanging devices.

U.S. Application No.: 09/877,810

Attorney Docket No.: EMC02-25(01087)

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Claims 42-44 (Canceled).